Information Systems Research

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Can't Buy Me Love…Or Can I? Social Capital Attainment Through Conspicuous Consumption in Virtual Environments

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Conspicuous consumption affects anyone who cares about social status; it has intrigued sociologists and economists for more than 100 years. The idea that conspicuous consumption can increase social status, as a form of social capital, has been broadly accepted, yet researchers have not been able to test this effect empirically. In this work, we provide empirical evidence by analyzing the digital footprints of purchases and social interactions in different virtual worlds. We use a multimethod approach, such that we both analyze transactional data and conduct a randomized field experiment. Virtual worlds, as artificial laboratories, offer the opportunity to analyze the social capital of their inhabitants, subsequent to their purchase of virtual prestige goods, which provides a means to empirically test hypotheses that would be nearly impossible to test in real-world settings. Our results are consistent with the notion that conspicuous consumption represents an investment in social capital.

1. Introduction

Mia: *Why would I care about your car?*
Charlie: *It's an $80,000 Mercedes.*
Mia: *Yeah, so what does it do that other cars don't do?*
Charlie: *It costs $80,000!*
—Two and a Half Men (Season 3)

In his seminal book *The Theory of the Leisure Class*, Veblen (1899) first formulated the notion of conspicuous consumption. This term refers to the practice of purchasing products to signal one's own social status to others (Braun and Wicklund 1989). Veblen (1899) argued that people consume highly conspicuous goods and services to provide evidence of their wealth and distinguish themselves from the lower class (i.e., invidious comparison). This form of signaling has been discussed in other settings as well: Zahavi (1975) proposed the "handicap principle" in biology to explain how reliable signals between animals that have an obvious motivation to bluff or deceive each other can be established through costly traits—namely, a handicap. In evolutionary psychology, Miller (2000)

pointed to the possession of prestige goods, such as luxury cars and other forms of conspicuous consumption, as a human example of the handicap principle, such that the ability to afford prestige goods advertises fitness to the opposite sex. At a broader level, conspicuous consumption allows consumers to attain or maintain social status, which Linton (1936) defined as the rank or position a person holds in a group or society. Treating social status as a form of social capital, Nahapiet and Ghoshal (1998, p. 243) concluded that "significant social capital in the form of social status or reputation can be derived from membership in specific networks, particularly those in which such membership is relatively restricted" (see also Burt 1992, D'Aveni and Kesner 1993).

Social resources theory (Lin 1982) also has proposed specifically that access to and uses of social resources, which are embedded in the routine social networks to which an individual belongs, are closely associated with socioeconomic status. Campbell et al. (1986) provide

evidence for this argument by showing that socioeconomic status is significantly associated with a person's number of contacts, a proxy for social resources. We similarly examine if social capital, defined as the accessible social network resources that a person can activate for an instrumental purpose at any certain moment, is affected by conspicuous consumption. Although previous research has discussed the effect of conspicuous consumption on social capital theoretically (e.g., Bagwell and Bernheim 1996, Becker et al. 2005), no empirical work confirms this effect. The lack of empirical evidence for the impact of conspicuous consumption on social capital is due in part to the difficulty of objectively observing and measuring social capital.

However, recent advances in Internet technology have made increasingly detailed data about social interactions and social relationships available to researchers (Lazer et al. 2009). For example, virtual worlds offer great potential for research in social, behavioral, and economic sciences (Bainbridge 2007). By analyzing the digital footprints of social interactions, we can examine the quantitative impact of purchase decisions on social capital, using social network analysis, a key technique for analyzing social structure that previously has been applied in studies in sociology, medicine, management, and economics (e.g., Van den Bulte 2010, Hinz et al. 2011, Bapna and Umyarov 2015, Oestreicher-Singer and Sundararajan 2012). Specifically, to empirically test the impact of conspicuous consumption, we need to observe changes in social capital over time and the evolution of a network structure, following an instance of conspicuous consumption. The virtual worlds that we investigate for this study are well suited to this purpose: they offer an opportunity to observe social capital and purchases, as well as instances of lavish spending that have no purpose other than to distinguish the purchaser from others. To our knowledge, this is the first study to quantify the effect of conspicuous consumption on social capital and provide empirical findings, attained from a combination of observational and experimental field data.

2. Theory and Previous Research

Conspicuous consumption is a signal that aims to improve a person's social standing among his or her peers:

> The basis on which good repute in any highly organized industrial community ultimately rests is pecuniary strength; and the means of showing pecuniary strength, and so of gaining or retaining a good name, are leisure and a conspicuous consumption of goods. (Veblen 1899, p. 70)

Consumers' preference for a Veblen good thus increases as a direct function of its price. A higher price confers greater status; contrary to the law of demand, a higher price creates demand that cannot be explained by the good's quality-adjusted utility alone. A frequently cited example is an exclusive handbag; the world's most expensive handbag is the "1,001 Nights Diamond Purse" by the House of Mouawad, priced at $3.8 million.[1] Other signature handbags that convey exclusivity and status are available for tens of thousands of dollars. Marshal Cohen, chief analyst for the research firm NPD Group, observes the following regarding the quality of these handbags: "There's really little difference at some point—it's the status that comes along with it and the desire to separate yourself."[2] The conspicuous consumption of prestige goods in turn allows the luxury industry to earn $80 billion in revenue each year.

Consistent with Veblen (1899), conspicuous consumption appears to be a consequence of consumers' desire to signal their wealth (Bagwell and Bernheim 1996, Corneo and Jeanne 1997) or status (Amaldoss and Jain 2005). Status is a form of social capital (Nahapiet and Ghoshal 1998), and access to and use of social resources (Lin 1999a)—that is, the resources embedded in social networks—are a precursor of socioeconomic status (Lin 1982), which can be measured by the person's position in a social network.

Previous literature on social capital also has theorized about the development of social networks. Social capital, as a form of personal capital, represents an investment with an expected return (Lin 1982, Coleman 1988, Burt 1992, Portes 1998). The return on investing in social capital is an increase in access to and utilization of resources within social networks. It is based on some increase in information, influence, social credentials, or reinforcement (Lin 1999b). For example, weak ties—that is, acquaintances rather than close friends—can help people find new jobs (Granovetter 1973). Various other examples indicate how social capital can be transformed into economic capital, such as through auctions (Hinz and Spann 2008), assigning of credits (McMillan and Woodruff 1999), or word-of-mouth processes (Schmitt et al. 2011). Thus, people may have an economic rationale for improving their social position in a network; Griskevicius and Kenrick (2013) even identify making friends and attaining status as fundamental motives for purchases.

With respect to the mechanism that drives the attainment of social capital, previous literature is rather unspecific though. We therefore propose a distinction between passive and active roles:[3] First, social

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[1] This handbag features 4,517 diamonds and took 10 artisans 8,800 hours to complete (http://elitechoice.org/2011/02/18/1001-nights-diamond-purse-from-the-house-of-mouawad/).

[2] http://www.forbes.com/2006/05/23/luxury-handbags-fashion_cx_ls_0524feat_ls.html.

[3] We thank an anonymous reviewer and the editors for suggesting this helpful clarification.

capital might increase through a form of preferential attachment, such that the focal person receives new contacts. Bagwell and Bernheim (1996) argue that those who provide evidence of their wealth earn the reward of preferential treatment from others. Conspicuous consumption thus elicits favorable treatment, as is also commonly observed for high-status individuals (e.g., Berger et al. 1980, Henrich and Gil-White 2001). People who consume conspicuously are contacted more often and have a higher likelihood to be chosen as a friend (see Berger et al. 1980). Second, prestige goods may bolster a person's self-confidence or self-esteem, increasing his outgoing behavior, which ultimately could lead to social capital attainment. Experimental psychology provides some evidence for this mechanism in experimental studies that show that the possession of status confers various psychological rewards (Berger et al. 1980), including self-esteem (Berger et al. 1972) and a sense of power (Rucker and Galinsky 2009). Sivanathan and Pettit (2010) conclude that ego-enhancing benefits make the consumption of status-infused prestige goods attractive and affirmational (Fromm 1976, Belk 1988, Beggan 1992). In accordance with these two mechanisms, conspicuous consumption likely drives the social capital of the owner of a prestige good. We aim to test this prediction empirically.

3. Analysis of Transactional Data

3.1. Description of Study Setting

With our first empirical study, we examine the effect of conspicuous consumption on the development of social capital. We operationalize node degree as a measure of social capital, in line with previous research (e.g., Campbell et al. 1986, Wasko and Faraj 2005). Each subject's degree is the number of others (e.g., friends, family, coworkers) with whom he maintains a direct communication relationship.[4] The measure of node degree often serves as a proxy for social capital, because people intuitively infer their social position from their direct neighborhood. Those with a high node degree have high social capital and can take advantage of this social position in various situations. The concept of networking also relies on this basic idea.

We use data from the virtual world Habbo (previously called Habbo Hotel), a service that began in 2000 and has expanded to include versions for 11 different languages and over 273 million registered avatars as of December 2012. For this study, we focus on the largest European Habbo community. In general, the site receives an average of more than five million unique visitors per month, with an average visit duration of 41 minutes, and 90% of the users are between 13 and 18 years old (Sulake 2012). Habbo offers a place to meet new and existing friends and play simple games; it is mainly driven by the communication among players. From time to time, celebrities such as Justin Bieber, Ke$ha, or the Sugababes log into the game with their avatar and communicate and interact with fans. The main purpose of this virtual world is to meet new people, make new friends, and, considering that it appeals mainly to teenagers, flirt with others.[5] Habbo mainly generates its revenue through the sales of virtual products. Although interacting and chatting with others does not depend on the purchase of virtual items, such items often help start a communication.

The available products are mainly furniture-like digital items that buyers can use to personalize their chat rooms, which anyone can visit. Buying such items is thus conspicuous to other members of the community. Some pieces of furniture are common; basic items such as wallpaper are always available. Others are more expensive and may be available only for a limited period. These items typically are more attractive and may impress or even astonish other players. Anecdotal evidence also suggests that they are associated with higher social status. For example, Lehdonvirta (2009) reports that in the virtual game Ultima Online,

> ...one of the most highly valued virtual items in the whole system was a small brown lump named 'horse dung.' Despite its very modest appearance and complete lack of performance or functionality, people have paid the equivalent of hundreds of U.S. dollars for the item. The reason is that in Ultima Online, horse dung is extremely rare...owning one of these was a status symbol, akin to owning a diamond in the real world. (p. 11)

In reference to Habbo, Lehdonvirta (2009) also recounts examples of nonfunctional virtual record players and "Plastyk chairs," valued at approximately $290.

From the operator of Habbo, the Sulake Corporation, we obtained data for a particular period, during which it introduced a new type of prestige goods—in this case, kitchen furniture items, introduced on September 4, 2009, and some items available only until September 21, 2009 (Figure 1 illustrates a Habbo kitchen with the items). According to the site managers, these new kitchen furniture items represented prestige goods in the focal community (Hinz et al. 2010).

We also collected data on other items sold during this period. Furthermore, we acquired data about player characteristics, such as their birth dates and date of first login. We had access to activity data too, such as the number and duration of each visit during the study period.

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[4] Further details are available in studies of social network analysis (e.g., Wasserman and Faust 1994).

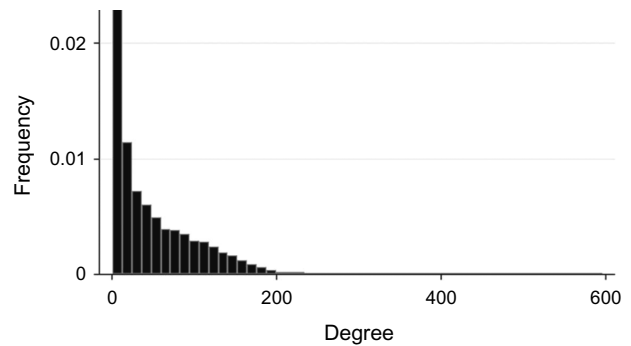[5] Such uses have led to problems, unfortunately. See, for example, http://www.channel4.com/news/should-you-let-your-child-play-in-habbo-hotel.

Figure 1   (Color online) Screenshot of Kitchen Furniture

Figure 2   Distribution of Node Degrees

The crucial information for our analysis came from data on the social network among the players and its development during the observation period. We took eight database snapshots of the friendships data table during the sales period (on 2009-09-04, 2009-09-07, 2009-09-09, 2009-09-11, 2009-09-14, 2009-09-16, 2009-09-18, and 2009-09-21). Friendship is bidirectional, so if player A chooses to befriend player B, and B confirms it, the relationship is stored in the database. Such bidirectional relationship data can be found in many Web 2.0 applications, such as Facebook, LinkedIn, and instant messengers. Overall, the data set thus comprises hundreds of gigabytes of information; some calculations took several hours (or even days), highlighting the increasing challenge of big data for social sciences.

3.2.   Descriptive Statistics

For the purposes of our study, the community contained 1,520,025 registered avatars, among whom we observed about 28 million friendship relationships. However, we also found many inactive avatars, such that during the observation period, we observed only 135,374 active players. We focus on active players and their networks (logged at least once during the observation period) and thus use the activity criteria for our boundary specification strategy (Laumann et al. 1989). The average node degree for active players in this period was 52, with a standard deviation of 62. Many avatars had no or very few friends; a marginal number of players had more than 200 friends each. The distribution of node degrees, as depicted in Figure 2, thus followed a power law and indicated a scale-free network (see Barabási and Albert 1999).

Overall, 22,037 players purchased virtual items and generated 190,204 transactions during the observation period. That is, only a fraction of players invested money, but they purchased more than eight items on average. The 190,204 transactions consisted mainly of basic furniture but also some new, prestigious kitchen items that were available for only a limited time period. We focused on these new kitchen furniture items and observed that 2,883 purchasers bought these prestige goods.

In the 18 days of our observation period, players spent an average of five hours in the online community and visited the community about 8.6 times. The distribution of node degrees is heavily skewed; the standard deviation indicates a few heavy users with many friends and a large number of players with very few friends. Table 1 summarizes the descriptive statistics.

We analyzed the development of the network from the start date (2009-09-04) until the end date (2009-09-21) and observed that the number of active players increased by +18.3%; the number of friendships increased as well, but less markedly, by +9.5%. Because of the high number of new players in this period, the average node degree decreased by −7.4%.

A closer look at the development of the social network reveals the following: Players who buy regular goods stayed relatively stable, with a node degree around 68.1. By contrast, players who buy the prestige goods increased their node degrees, on average, from 92.4 to 98.0, an increase of +6.1%. Obviously, new players are not as experienced and probably not as likely to buy virtual items for real money. We therefore focused in the first analysis on players who were active before the observation period ($n = 135,374$). These players, on average, increased their node degree by about +8.1%. Players buying regular goods increased their node degree by +9.4%, whereas buyers of the prestige goods (i.e., kitchen furniture) enhanced their node degree +14.5% and won about 13 new friends (see Table 2).

3.3.   Identification Strategy

Social capital thus develops differently for different types of players. This development is not necessarily evidence of growth in social capital due to conspicuous consumption; it could indicate a difference in the players' characteristics or activity levels. In other words, more social capital at the start indicates self-selection

Table 1   Descriptive Statistics

Number of total players including inactive (on 2009-09-04)	1,520,025
Number of total friendships including friendships with inactive players (2009-09-04)	28,047,488
Number of active players (=boundary specification) on 2009-09-04	135,374
Number of active players (=boundary specification) on 2009-09-21	160,134
Number of friendships (in bounded network) on 2009-09-04	7,002,709
Number of friendships (in bounded network) on 2009-09-21	7,666,985
Number of purchases	190,204
Number of purchasers	22,037
Number of prestige goods purchasers	2,883
Average time active in hours (StdDev/Min/Max)	4.96 (12.04/0.01/237.27)
Average number of visits (StdDev/Min/Max)	8.58 (19.73/1/4,965)
Average degree (StdDev/Min/Max) on 2009-09-04	51.7 (62.00/0/596)
Average degree (StdDev/Min/Max) on 2009-09-21	47.9 (60.46/0/582)

by players. To achieve causal identification, we employ a combination of additional strategies.

First, we control for player-specific background variables such as activity. Second, we use triangulation, based on a combination of between-subject and within-subject analyses, such that we compare the development of social capital across groups and the development of social capital for single players before and after their purchase of prestige goods. With the between-subject analysis, we thus address potential self-selection effects, using propensity-score matching, and we carry out several robustness checks. However, we cannot completely rule out the potential omission of causal variables, such as the ability to make friends or other unobserved player characteristics, which might create an omitted variable bias. We therefore conducted a within-subject analysis to compare social capital growth before and after the purchase of a prestige good, while controlling for activity. Player characteristics are unlikely to change during the short course of the sales period, so it would be improbable that any omitted variables could cause effects of conspicuous consumption in both, rather discriminant analyses.

3.4.   Between-Subject Analysis

The model-free analysis demonstrates that buyers of the prestige good increase their social capital on average

Table 3   Propensity Score Matching

Initial node degree	0.0034 (0.0001)***
Age	0.0015 (0.0009)
Membership duration	−0.0003 (0.0000)***
Intercept	−2.220 (0.0199)***

Notes. Probit regression, depicting the coefficients (standard errors). The dependent variable is the probability of purchasing the prestige good. Number of observations = 132,181.

   ***$p < 0.01$.

(see Table 2). However, this result may be biased by self-selection effects (Hitt and Frei 2002), in that more active and attractive players who tend to increase their social capital through their characteristics are also the ones who buy prestige goods. In this case, the reported increase in social capital (Table 2) cannot be attributed solely to the purchase of the prestige good. We seek to separate the potential self-selection effect from the "treatment" effect of buying the prestige good with regard to a player's social capital.

3.4.1.   Addressing the Self-Selection Bias. To isolate the effect of prestige good purchases on social capital, we use propensity-score matching (Rosenbaum and Rubin 1983). This methodology aims to create matching pairs of treated and nontreated subjects, which differ solely with respect to the treatment variable and not on any observed covariates. Therefore, we created matching pairs between players who bought the prestige good and those who did not (i.e., we found players who did not buy and matched them to purchasers on the basis of observable characteristics). Next, we compared the social capital of the two groups to measure the isolated effect of prestige good purchases on social capital.

To define the matching pairs, we estimated each player's propensity to buy the prestige good, according to observable player characteristics: the initial node degree at the start of the observation period, their age, and their membership duration (in days) in the online community. Table 3 depicts the results of the propensity-score matching, which shows that a propensity to buy a prestige good increases with the player's initial number of ties but decreases with membership duration.

Next, we used the players' propensity scores to create matching pairs (i.e., find comparable nonpurchasing players, according to a similar propensity score). To this end, we employed a kernel matching procedure. Kernel matching accounts for all players in the nonpurchase group as potential matches but weights them according

Table 2   Detailed Change of Node Degree for Different Segments

		Total	Buyers of regular goods	Buyers of prestige goods
Total player base	Avg. degree	51.7 → 47.9 (−7.4%)	68.1 → 68.1 (+0.0%)	92.4 → 98.0 (+6.1%)
Only existing players	Avg. degree	51.7 → 55.9 (+8.1%)	68.1 → 74.5 (+9.4%)	92.4 → 105.8 (+14.5%)

Table 4   Effect of Prestige Good Purchases on Node Degree

	Treated	Controls	Difference	Std. err.	T-stat.	Matching
Sample (all)						
Unmatched-deg. change	13.212	3.794	9.418	0.380	24.79	Kernel
Matched-deg. change	13.212	3.770	9.442	0.803	11.76	
Unmatched-deg. change	13.212	3.794	9.418	0.380	24.79	Nearest
Matched-deg. change	13.212	3.419	9.793	0.989	9.9	neighbor
Sample (<200 friends)						
Unmatched-deg. change	15.006	4.149	10.858	0.341	31.87	Kernel
Matched-deg. change	15.006	4.167	10.840	0.698	15.53	
Unmatched-deg. change	15.006	4.149	10.858	0.341	31.87	Nearest
Matched-deg. change	15.006	4.711	10.296	0.843	12.21	neighbor

to their propensity score (Froelich 2004). Finally, we compared the effect of purchasing the prestige good on the change in social capital (i.e., change in node degree) between purchasers and the matched sample of nonpurchasers.

Table 4 depicts the results for the change in node degree among the matched and unmatched samples. When we did not control for self-selection effects, the impact of prestige good purchases on the degree change was slightly underestimated (Table 4, third row). Even when controlling for self-selection effects though, we found that the purchase of the prestige good bolstered a player's social capital significantly ($p < 0.01$), increasing his node degree by an average of 9.4 friends (Table 4, third row). Thus, conspicuous consumption can "buy" friends.

3.4.2.   Robustness Checks. We carried out several robustness checks. First, we tested a different matching algorithm (nearest-neighbor matching) and found consistent results (see Table 4). Second, we excluded users with 200 or more friends from the analysis and still found consistent results for both matching algorithms (kernel and nearest-neighbor matching). The effect of prestige good purchases grew even stronger among the subsample of users with fewer than 200 friends (Table 4). Third, we compared the treatment and control groups (nearest-neighbor matching) on the basis of the three observable player characteristics that we used to calculate the propensity score and found no significant differences on any dimension. We also tested eigenvector centrality, which measures the importance of a node in the network, as a proxy for social capital (Bonacich 1972). Thus, we assigned relative scores to all nodes in the network, according to the principle that connections to high-scoring nodes contribute more to the score of the node in question than similar connections to low-scoring nodes. Whereas node degree as a measure of centrality weights every contact equally, eigenvector centrality weights contacts according to their centralities. These additional tests supported our findings that conspicuous consumption significantly increases social capital, and thus, we found empirical support for Veblen's hypothesis.

3.5.   Within-Subject Analysis
Without a complete set of observable and unobservable player characteristics, it is always possible that omitted variables bias the coefficients. We therefore conducted a within-subject analysis to examine the effect of the purchase of a prestige good, on an individual basis. We focused on subjects who purchased a prestige good and were already members of the virtual community at the beginning of the observation period. These 2,640 subjects yielded a total of 18,480 observations ($= 7 \times 2,640$, or seven time periods for each subject). We also tested our model for all subjects, including purchasers of regular goods and nonpurchasers, which provided an overall sample of 134,285 subjects and 939,995 observations. We estimated the effect of prestige good purchases (and purchases of regular goods) on the natural logarithm of the number of friends at the end of a period t.[6] To control for time trends, we included period dummies (T1 to T6) and individual activity, measured by the number of visits in period t. Therefore, we can test whether the prestige good purchase yielded a one-time but persistent shift in the number of friends. The dummy variable *PrestigeGood* is equal to 0 before a prestige good purchase and 1 after the purchase. In additional models, we also included a dummy variable for buyers of regular goods, *RegularGood*, equal to 0 before the first regular good purchase in our observation period, and 1 afterward. The Hausman test indicated unobserved heterogeneity ($p < 0.01$), so we used a fixed-effects regression with robust standard errors. Equation (1) displays our full estimation model

$$\begin{aligned} \text{Log}(FriendsPeriodEnd_{it}) \\ = \beta_0 + \beta_1\, PrestigeGood_{it} + \beta_2\, NoVisits_{it} + \beta_3 T1 \\ + \beta_4 T2 + \beta_5 T3 + \beta_6 T4 + \beta_7 T5 + \beta_8 T6 \\ + \beta_9\, RegularGood_{it} + \alpha_i + \varepsilon_{it}, \end{aligned} \quad (1)$$

where i refers to the subject, and t indicates the time the covariate was measured for subject i. The variable α_i

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[6] We log-transformed the dependent variable to account for its skewed distribution (2.5% of users have >200 friends).

Table 5 Within-Subject Analysis for the Dependent Variable Log(Social Capital at Period End)

	(1)		(2)		(3)		(4)	
	Coeff.	S.E.	Coeff.	S.E.	Coeff.	S.E.	Coeff.	S.E.
Prestige good	0.050***	(0.011)	0.065***	(0.010)	0.046***	(0.014)	0.091***	(0.011)
Number of visits	0.005***	(0.001)	0.008***	(0.000)	0.005***	(0.001)	0.008***	(0.000)
Regular good					−0.010	(0.018)	0.066***	(0.005)
Period controls[a]	Yes		Yes		Yes		Yes	
Constant	4.061***	(0.012)	3.276***	(0.001)	4.065***	(0.014)	3.268***	(0.001)
F	34.759		1,318.764		31.266		1,179.179	
R^2 (within)	0.070		0.055		0.070		0.056	
No. of obs.	18,480		939,995		18,480		939,995	
No. of groups	2,640		134,285		2,640		134,285	

Note. Robust standard errors are in parentheses, and all variance inflation factors were less than 4.

  [a]Dummy variables for period 1 to period 6.

  $^*p < 0.1;^{**}p < 0.05;^{***}p < 0.01$.

captures subject-specific characteristics, and β_1 is the variable of interest. Table 5 summarizes the results of all of the models, namely, (1) the base model for prestige good purchasers (sample 1), (2) the base model for the full sample of all purchasers and nonpurchasers, (3) sample 1 with the variable for the effect of regular good purchases, and (4) the full sample with the variable for the effect of regular good purchases.

We first observed that the explained variance within groups was rather low. However, the low *R*-square values of 6% to 7% were not surprising; we expected conspicuous consumption to have a small effect. Consistent with the between-subject analysis, we found a significant effect of possessing a prestige good on individual social capital ($p < 0.01$). When we analyzed the sample of status good purchasers and included the purchase of a regular good (model 3), we observed an insignificant coefficient for *RegularGood*. In model 4, which included all purchasers and nonpurchasers, we found that possession of a regular good also can increase social capital, though the effect of the prestige good on social capital was significantly stronger than the effect of the regular good (Wald test: $p < 0.05$). Possessing the prestige good increased social capital by 1.6 to 3.1 friends in all following periods.[7] We further observed that activity (i.e., number of visits) was a driver of social capital ($p < 0.01$), which made theoretical sense, because it is necessary to engage in time-consuming social interactions to increase social capital. We uncovered a positive time trend, in that social capital in earlier periods was significantly lower than in the last (baseline) time period ($p < 0.01$). We observed consistent results when we accounted for period length (two or three days).

The within-subject analysis ruled out several alternative explanations. However, we ultimately cannot rule out the alternative explanation that as a person

increases his connections over time, he wants to make the virtual room nicer and therefore tends to purchase prestige goods. We therefore conducted a randomized field experiment with two comparable groups, to identify the causal effect more clearly.

4. Field Experiment

Because our previous analyses could not completely rule out spurious correlation, we conducted a field experiment with a between-subject design in a similar context but different setting: We set up an experiment in a relatively new, massively multiplayer online role-playing game (MMORPG). Similar to Habbo, the game was free to play, and the operator sold virtual items on a regular basis, providing its main source of revenue. The game was released in Europe after some beta testing in January 2014. No official information was available about the number of players, but the game attracted about 140,000 fans on Facebook as of March 2014. We decided to conduct our experiment in this relatively new virtual world for several reasons. First, in long-established games like *World of Warcraft*, players already possess dozens of impressive mounts or suits of armor, so new prestige goods might have a very small effect. Second, a game mechanism in this virtual world enabled us to conduct a randomized experiment in a (virtual) field setting.

We waited several weeks after the game's release to start the experiment, because many friendships from real life are likely to be confirmed at the start of the game. We conducted the experiment on a Western European server. The operator agreed to sell one type of good, a unique riding mount (see Figure 3), that should be associated with status in this experimental setting.

Prior to the experiment, the riding mount was available only to a select group of players who were members of the heavy-spender program, an in-game loyalty program; they had to have spent approximately $199

[7] According to the calculation of the marginal effects of Prestige Good on exp(log(FriendsPeriodEnd)).

Figure 3   (Color online) Screenshot of Prestigious "Riding Mount"

on other goods to gain access to the riding mount. We decided to give this prestige good to a small sample of players in a randomized field experiment. In the real world, such an experiment would have implied giving a Porsche or access to airlines' elite status programs (e.g., Platinum) randomly to certain people, then comparing the development of their social capital against the development of social capital of comparable persons without the prestige good.

4.1. Experimental Setup
We designed the field experiment as follows: The operator created a raffle for 40 mounts, with raffle tickets priced at €2 (~US$2.80 at the time of the study). The 40 winners received one mount each, and "losing" ticket holders received functional items that could not be conspicuously consumed (e.g., healing potions), as consolation prizes. Players who wanted to obtain the prestige good were separated by this random mechanism into a treatment group (i.e., players desiring and then possessing the prestige good) and a control group (i.e., players desiring but not receiving the prestige good), which we refer to as "control group 1." In addition, we examined the behavior of a second control group, "control group 2," that consists of a random sample of players, representing the average population of gamers.

This experiment rests on the idea that wealth and income are unobservable traits (e.g., Drèze and Nunes 2009), and prestige goods are costly—and thus credible—signals that actually allow people to exhibit this trait (i.e., "the means of showing pecuniary strength . . . are leisure and a conspicuous consumption of goods"; Veblen 1899, p. 70). Therefore, we provided

some subjects of one population with a prestige good, so they could show off this trait, while other subjects of the same population did not possess the prestige good. A potential limitation of this experimental setup is that the lottery mechanism could mitigate the status effect of the good, so to avoid this effect, we raffled only 40 prestige mounts. Moreover, we announced neither the names of the winners nor the fact that the mounts had been raffled, which should limit the potential problem of ruining the mount's prestige status through the raffle mechanism.

We also conducted a test of players' beliefs about the source of the mount. If the majority of players believed that possessing the mount would require heavy spending, the signal would be credible, so economic theory would suggest the mechanism worked as intended. The profitable counterfeiting of prestige goods offers robust evidence in this respect: Consumers who knowingly buy counterfeit products value only the prestige associated with the genuine product; they are fully aware that the goods they buy are fake and of rather low quality (Mason 2000). As Grossman and Shapiro (1988, p. 82) point out, "the counterfeiting of a status good . . . deceives not the individual who purchases the product, but rather the observer who sees the good being consumed and is duly (but mistakenly) impressed." A rich stream of economic literature supports the assumption that as long as an observer believes that the good was expensive and hard to get, conspicuous consumption should have an effect on social capital.

The raffle was exclusively advertised on the website of the operator; it was possible to buy a lottery ticket for one week. Before raffling off the mounts, the publisher took a snapshot of the database and then distributed the mounts to the winners in the treatment group and some utilitarian (i.e., regular, nonstatus) goods to the players in control group 1. Ten days later, the publisher took another snapshot of the database, which enabled us to compare the development of social capital between the treatment and control groups. The operator also provided information about the players so that we could test if the treatment and control group 1 were similar.

To test whether our experiment changed the association of the focal item, we conducted a short survey about eight months after the experiment and asked players of this community about how accessible this and other mounts had been. Of the 779 players who answered this question, 89.2% indicated that the mount we used in the lottery was obtainable through cash-related channels (e.g., heavy-spender program, in-game shops) and required a high investment. Only 3.2% stated that the mount was accessible solely by winning a lottery, and another 7.5% incorrectly claimed it was available as an in-game quest reward or not available at all.

4.2. Results

The treatment group consisted of 39 players who won a mount. Control group 1 consisted of 522 players, and control group 2 consisted of 1,000 players. Some players, including one winner, deleted their account before the second snapshot, so we excluded them from our analysis. We also captured information about their gender, age, number of friends before the experiment, date of first login, number of logins, money spent before and during the experimental phase, and virtual account balance before and during the experimental phase. For these variables, we did not observe any statistical differences between the treatment group and control group 1 ($p > 0.1$). That is, both groups were statistically equivalent, and our randomization created two comparable groups.

However, the treatment group and control group 1 differed from control group 2, in that the participants in the lottery were younger ($p < 0.1$), already had more friends before the experiment ($p < 0.01$), started to play earlier ($p < 0.01$), had more logins ($p < 0.01$) and spent more money ($p < 0.01$), though this last feature was related to their longer play period. The players who were trying to obtain the prestige good thus were heavy players, with a higher tendency to spend money on virtual items. Control group 2 instead consisted mainly of casual gamers.

Before the experiment, subjects in the treatment and control group 1 had about 13.5 friends on average, with a minimum of 0 and a maximum of 89 friends. Subjects in control group 2 instead had only 6.1 friends on average, with a minimum of 0 and a maximum of 98 friends. The subjects in the treatment group gained about 2.67 friends after obtaining the prestige good, whereas those in control group 1 only gained 1.21 friends. Subjects in control group 2 added about 0.48 friends on average. Thus, subjects in the treatment group and control group 1 exhibited a higher tendency to increase their social capital than the average population. However, subjects that possessed the focal prestige good made about +1.46 more friends than their peers in control group 1. The *t*-tests and analyses of variance showed that all pairs (treatment group versus control group 1 and treatment group versus control group 2) exhibited statistically significant differences ($p < 0.05$). Therefore, possessing prestige goods appeared to increase social capital. This result was robust even when we considered covariates in the comparison of the treatment group to control group 2.

This experiment had its own limitations though. First, we cannot prove that all peers in the community regarded the raffled mount as a prestige good. We tried to assess this perspective in the survey, and the results gave us confidence that the majority of the community believed the mount was an expensive purchase. Second, the mere aspect of winning the lottery may change players' behavior, such that winners tend to socialize more with others to "show off" their luck, which ultimately would increase their social capital. We therefore constructed a new control group of "heavy spenders" that consisted of players who tried to but did not win the mount. This subsample spent the amount of money during the experimental period that would be necessary to buy the prestige good ($n = 15$). A substantial winner effect should invoke a significant difference between the winners and these heavy spenders. Instead, we observed an insignificant difference between the two groups in terms of the increase in their social capital ($p > 0.2$), indicating that the purchased/won goods drove the difference, not the "winner effect." Still, we cannot completely rule out this alternative explanation for the impact of obtaining the mount on the increase in players' social capital.

5. Discussion

Using data from virtual environments, we study the effect of conspicuous consumption on social capital. In an initial analysis, we separated the self-selection effect (e.g., more active or attractive players buy prestige goods) from the treatment effect (e.g., buying prestige goods increases social capital) by creating matching pairs based on observable characteristics. That is, we found comparable players who did not engage in conspicuous consumption for each player who conspicuously consumed. Even when accounting for self-selection, our results revealed a significant, large effect of conspicuous consumption on enhanced social capital. A conspicuously consuming player added 13.2 friends on average, whereas a matching nonconsumer earned only 3.8 additional friends over the same period.

A within-subject analysis confirmed the effect of conspicuous consumption on social capital growth. Subsequent to the purchase of a prestige good, social capital increased by 1.6–3.1 friends in all following periods, even when we controlled for activity and time trends. Owning a prestige good signals wealth, social capital, and perhaps even expertise in the virtual community, as well as in reality. This status attracts people with whom social ties might evolve, likely through subsequent conversations. The interaction could be initiated by either the owner of a prestige good or subjects who contact this owner. In both cases, the prestige good can serve as an "icebreaker."

To strengthen the generalizability of the causal relationship between conspicuous consumption and social capital, we complemented this analysis of the observational data with a field experiment in a virtual world. In a randomized field experiment, we raffled off 40 prestigious riding mounts and created a treatment and a control group that did not differ in their observable characteristics or their desire to possess the riding

mount. We instead found a significant difference in social capital growth subsequent to the acquisition of a prestige good, in support of Veblen's (1899) theory. The results also show that people who purchase prestige goods differ significantly from the average player. Without considering self-selection, we would have overestimated the effect of conspicuous consumption on social capital in this case.

With this article, we apply several different methods. We start with the weakest test of our hypothesis, a between-subject analysis. We compare the development of social capital between a treatment and a control group. A simple comparison of the groups based on observational data could be biased by self-selection, so we use propensity-score matching to partial out this bias. Without controlling for self-selection effects, the impact of prestige good purchase on social capital would be slightly underestimated in this case. However, in online environments, especially free-to-play games, we lacked access to a rich and solid data set that would allow us to find comparable twins reliably. Omitted variables such as latent player characteristics could bias the results, so the results of this analysis require careful consideration. In a second step, a within-subject analysis reveals the changes in players' social capital, subsequent to the purchase of a prestige good. This method rules out the potentially confounding influences of factors that stay constant within the observation period, such as traits and demographics that are unlikely to change over a month. Variance that is orthogonal to the terms of our system might help build confidence in the results, but good instrumental variables are notoriously hard to find. This difficulty often prompts extended discussions about alternative mechanics that may introduce some correlation of the instrumental variables with the error term.

We instead decided to conduct a randomized field experiment to identify causality, because the data analyses can be carried out with simple *t*-tests or analyses of variance. However, field experiments are not an easy undertaking, especially if they require support from businesses. In our case, it took several months and many meetings with different firms to identify a suitable environment and a willing partner. Yet with the resulting randomized field experiment, in which some subjects won a prestige good and others from the same population did not, we were able to rule out every other explanation except a possible winner effect. The comparison of heavy spenders that tried to win the mount but did not and winners did not reveal any significant winner effect though, ultimately indicating that the prestige goods mainly drive the social capital increase.

All of the methods and data sets supported the theory of conspicuous consumption; the triangulated approach thus should help build trust in the results.

By combining different methods and empirical data, we sought to overcome the inherent limitations and problems that stem from a single method or study. Our range of methods should also be helpful for researchers in other disciplines or research fields who seek to investigate the effect of conspicuous consumption on social capital empirically.

The generalizability of our results may be limited in terms of age groups, cultural contexts, and the offline versus real world. First, we analyze the impact of prestige good purchases on social capital in two virtual worlds. Habbo targets teenagers; the average age of players in the field experiment is about 24. This age distribution is right skewed, but we also observe many players in their 30s (∼18%) or 40s (∼4%) who play this MMORPG. A few players in our sample were older than 60. Therefore, the effect of conspicuous consumption is unlikely to be limited to teenagers and probably can be generalized to other age groups.

Second, with respect to different social backgrounds, we presented data from a German and another Western European community; we also examined data from a U.S. context (not presented herein). The results remained relatively stable, offering evidence of a positive effect of conspicuous consumption on social capital in different cultural contexts in the Western part of the world.

Third, the positive effect of conspicuous consumption on social capital likely is positive in real life, but the magnitude of the effect might differ substantially. Friendship is a binary distinction in the virtual worlds we studied; in the real world, friendship is more of a latent construct, as is social capital. Therefore, our data are proxy, valid operationalizations of the latent constructs. It would be interesting to examine the effect of conspicuous consumption on the intersection of real and digital worlds. For example, a posting on a Facebook wall about a real-life purchase of a prestige good seemingly might invoke more communication or social capital.

Granovetter (1985) suggests that economic life is embedded in the social environment and thus that subjects should not be treated atomically. Following this notion, it could be rational for subjects to consume conspicuously, even from a strict utility-maximizing perspective, if they can monetize their investment in social capital later. This effect also might explain why luxury brands have been so successful over such a long period of time.

Finally, our study illustrates that virtual environments and their data can be extremely valuable when trying to examine and understand consumer behavior. If the effects of social contagion are of interest, online environments provide data on relationships, communication, and transaction behavior to investigate these effects (Putzke et al. 2010). Such data are often stored

in easily analyzable formats (e.g., databases) or can be reconstructed from other sources, like conversation protocols (Lazer et al. 2009). However, extracting this information from increasingly larger sets of big data can be time consuming and computationally expensive. In line with Bainbridge (2007) though, we expect that more studies will benefit from the data generated by virtual communities and that more social science researchers will start to exploit this data opportunity.

Acknowledgments

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